

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (canceled).
2. (currently amended): A shape descriptor extracting method comprising:
 - (a) extracting a skeleton from an input image;
 - (b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and
 - (c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein (b) comprises connecting pixels having a same level on direction maps of a plurality of directions to obtain the first list of straight lines and pixels of the skeleton not having the same level on the direction maps of the plurality of directions are not connected.
3. (original): The method of claim 2, wherein the step (a) comprises:
 - (a-1) obtaining a distance map by performing a distance transform on the input image; and
 - (a-2) extracting the skeleton from the obtained distance map.
4. (previously presented): The method of claim 2, wherein the step (b) comprises:
 - (b-1) thinning the extracted skeleton; and

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(b-2) extracting the first list of straight lines by connecting respective pixels within the thinned skeleton.

5. (original): The method of claim 2, wherein the step (b) comprises:

(b-1) making a list of starting points and ending points of the connected lines; and

(b-2) obtaining the first list of straight lines by a straight line combination of the extracted straight lines;

and the step (c) comprises:

(c-1) determining the second list of straight lines, obtained by normalizing the first list of straight lines based on the maximum distance between ending points of respective straight lines, as the shape descriptor.

6. (previously presented): The method of claim 3, wherein the distance transform is based on a function indicating respective points within an object with the minimum distance value of the corresponding point from a background.

7. (original): The method of claim 3, wherein the step (a-2) comprises: obtaining a local maximum from the distance map using an edge detecting method.

8. (previously presented): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein the step (a) comprises:

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(a-1) obtaining a distance map by performing a distance transform on the input image;

and

(a-2) extracting the skeleton from the obtained distance map,

the step (a-2) comprises: obtaining a local maximum from the distance map using an edge detecting method, and

the step (a-2) comprises:

(a-2-1) performing a convolution using a local maximum detecting mask of four directions to obtain the local maximum.

9. (original): The method of claim 8, after the step (a-2-1), further comprising:

(a-2-2) recording a level corresponding to a direction having the greatest size on a direction map and a magnitude map.

10. (original): The method of claim 2, wherein the input image is a binary image.

11. (previously presented): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein the step (b) further comprises:

(b-1) thinning the extracted skeleton; and

(b-2) extracting the first list of straight lines by connecting respective pixels within the thinned skeleton, and

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the step (b-1) comprises:

leaving a pixel having the greatest size in a direction rotated by 90-degrees from the corresponding direction on the direction map, and removing the rest of the pixels.

12. (previously presented): A shape descriptor extracting method comprising:

(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein the step (b) comprises:

(b-1) thinning the extracted skeleton; and

(b-2) extracting the first list of straight lines by connecting respective pixels within the thinned skeleton, and

the step (b-2) comprises:

using the direction map of four directions, and making a list of starting points and ending points of respective line segments by connecting pixels having the same level on the direction map.

13. (original): The method of claim 5, wherein the step (b-2) comprises:

performing a straight line combination by changing threshold values of an angle between the straight lines, a distance, and a length of a straight line from the obtained first list of straight lines.

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14. (original): The method of claim 13, wherein the straight line combination is repeated until the number of remaining straight lines becomes equal to or less than a predetermined number.

15-19 (canceled).

20. (previously presented): The method of claim 2, wherein the step (a) comprises:

- (a-1) obtaining a map of the input image; and
- (a-2) extracting the skeleton from the obtained map.

21. (cancelled).

22. (currently amended): A shape descriptor extracting method comprising:
(a) extracting a skeleton from an input image;
(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and
(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,
wherein (b) comprises connecting pixels having a same level on direction maps of a plurality of directions to obtain the first list of straight lines ~~The method of claim 2, wherein (b)~~
comprises using the direction map of four directions, and making a list of starting points and ending points of respective line segments by connecting pixels having the same level on the direction map.

23. (currently amended): A shape descriptor extracting method comprising:

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(a) extracting a skeleton from an input image;

(b) obtaining a first list of straight lines by connecting pixels based on the extracted skeleton; and

(c) determining a second list of straight lines obtained by normalizing the first list of straight lines as a shape descriptor,

wherein (b) comprises connecting pixels having a same level on direction maps of a plurality of directions to obtain the first list of straight lines ~~The method of claim 2, wherein the~~ direction maps of the plurality of directions comprise masks of the plurality of directions.

24. (canceled).